

What is claimed is:

1. A processing method of a surround signal for virtually creating a surround left sound source and a surround right sound source to a first listener and a second listener through a front left speaker, a front center speaker, and a front right speaker, comprising the steps of:

placing the front left speaker and the front center speaker respectively to front left side and front right side of the first listener;

placing the front center speaker and the front right speaker respectively to a front left side and a front right side of the second listener;

arranging the front left speaker and the front right speaker symmetrically with respect to a central axis extending from the front center speaker and to the middle point between the first listener and the second listener, while arranging the first listener and the second listener symmetrically with respect to the central axis;

performing virtual localization processing to a given surround signal so as to produce a signal for creating virtual sound sources, and supplying the produced signal to the front left speaker, the front center speaker and the front right speaker; and

supplying the same signal for creating virtual sound sources to the front left speaker and the front right speaker so as to create the surround left sound source and the surround right sound source to both the first listener and the second listener.

2. In a surround signal processing system for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of a front left channel signal, a front center channel signal, a front right channel signal, a surround left channel signal and a surround right channel signal;

wherein resulting signals generated by mixing the surround left channel signal and the surround right channel signal are supplied to a virtual localization processing means as a first monophonic signal and a second

monophonic signal while the front left channel signal, the front center channel signal and the front right channel are supplied respectively to the front left speaker, the front center speaker and the front right speaker;

wherein a first virtual localization output of the virtual localization processing means is supplied to the front left speaker and the front right speaker; and

wherein a second virtual localization output of the virtual localization processing means is supplied to the front center speaker.

3. In a surround signal processing system for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of a surround left channel signal and a surround right channel signal;

wherein resulting signals generated by mixing the surround left channel signal and the surround right channel signal are supplied to a virtual localization processing as a first monophonic signal and a second monophonic signal;

wherein a first virtual localization output of the virtual localization processing means is supplied to the front left speaker and the front right speaker; and

wherein a second virtual localization output of the virtual localization processing means is supplied to the front center speaker.

4. The surround signal processing system according to claim 2, wherein the surround left channel signal is supplied to the front left speaker; and

wherein the surround right channel signal is supplied to the front right speaker.

5. In a surround signal processing system for virtually creating a surround left sound source and a surround right sound source through a front

left speaker, a front center speaker and a front right speaker upon receipt of surround channel signals;

wherein the surround channel signals are supplied to a virtual localization processing means as a first monophonic signal and a second  
5 monophonic signal;

wherein a first virtual localization output of the virtual localization processing means is supplied to the front left speaker and the front right speaker; and

wherein a second virtual localization output of the virtual localization processing means is supplied to the front center speaker.  
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6. The surround signal processing system according to claim 2, the system comprises a display device for displaying images thereon, and  
wherein at least the front speaker is built in the display device.  
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7. In a surround signal processing device for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of a front left channel signal, a front center channel signal, a front right channel  
20 signal, a surround left channel signal and a surround right channel signal;

wherein resulting signals generated by mixing the surround left channel signal and the surround right channel signal are supplied to a virtual localization processing means as a first monophonic signal and a second monophonic signal;

25 wherein a signal at least containing the front left channel signal and a first virtual localization output of the virtual localization processing means is output as a signal for the front left speaker;

wherein a signal at least containing the front right channel signal and the first virtual localization output of the virtual localization processing  
30 means is output as a signal for the front right speaker; and

wherein a signal at least containing the front center channel signal

and a second virtual localization output of the virtual localization processing means is output as a signal for the front center speaker.

8. In a surround signal processing device for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of a surround left channel signal and a surround right channel signal;

wherein resulting signals generated by mixing the surround left channel signal and the surround right channel signal are supplied to a virtual localization processing means as a first monophonic signal and a second monophonic signal;

wherein a signal at least containing a first virtual localization output of the virtual localization processing means is output as a signal for the front left speaker;

wherein another signal at least containing the first virtual localization output of the virtual localization processing means is output as a signal for the front right speaker; and

wherein a signal at least containing a second virtual localization output of the virtual localization processing means is output as a signal for the front center speaker.

9. In a surround signal processing device for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of at least a front left channel signal, a front right channel signal and surround channel signals;

wherein resulting signals, one of the which is generated by performing a subtract processing on the front left channel signal and the front right channel signal and the other is generated by adding the surround channel signals, are supplied to a virtual localization processing means as a first monophonic signal and a second monophonic signal;

wherein signals at least containing a signal capable of being obtained by providing a delay in time substantially equal to that of the virtual localization processing means on the front left channel signal and a first virtual localization output of the virtual localization processing means, are output as a signal for the front left speaker;

wherein signals at least containing a signal capable of being obtained by providing a delay in time substantially equal to that of the virtual localization processing means on the front right channel signal and the first virtual localization output of the virtual localization processing means, are output as a signal for the front right speaker; and

wherein signals at least containing a signal capable of being obtained by providing a delay in time substantially equal to that of the virtual localization processing means on a resulting signal generated by adding the front left channel signal and the front right channel signal and a second virtual localization output of the virtual localization processing means, are output as a signal for the front center speaker.

10. The surround signal processing device according to claim 7, wherein the surround left channel signal is further added to the signal outputted as the signal for the front left speaker, and

wherein the surround right channel signal is further added to the signal outputted as the signal for front right speaker.

11. In a surround signal processing device for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of surround channel signals;

wherein the surround channel signals are supplied to a virtual localization processing means as a first monophonic signal and a second monophonic signal;

wherein a signal at least containing a front left channel signal and a

first virtual localization output of the virtual localization processing means is output as a signal for the front left speaker;

wherein another signal at least containing a front right channel signal and the first virtual localization output of the virtual localization processing means is output as a signal for the front right speaker; and

wherein a signal at least containing a second virtual localization output of the virtual localization processing means is output as a signal for the front center speaker.

~~12.~~ In a surround signal processing device for virtually creating a surround left sound source and a surround right sound source through a front left speaker, a front center speaker and a front right speaker upon receipt of at least a front left channel signal, a front right channel signal and surround left and surround right channel signals;

wherein resulting signals, one of the which is generated by performing a subtract processing on the front left channel signal and the front right channel signal and the other is generated by adding the surround left channel signal and the surround right channel signal, are supplied to a virtual localization processing means as a first monophonic signal and a second monophonic signal;

wherein signals at least containing a signal capable of being obtained by providing a delay in time substantially equal to that of the virtual localization processing means on the front left channel signal and a first virtual localization output of the virtual localization processing means, are output as a signal for the front left speaker;

wherein signals at least containing a signal capable of being obtained by providing a delay in time substantially equal to that of the virtual localization processing means on the front right channel signal and the first virtual localization output of the virtual localization processing means, are output as a signal for the front right speaker; and

wherein signals at least containing a signal capable of being obtained

by providing a delay in time substantially equal to that of the virtual localization processing means on a resulting signal generated by adding the front left channel signal and the front right channel signal and a second virtual localization output of the virtual localization processing means, are  
 5 output as a signal for the front center speaker.

13. The surround signal processing device according to claim 7, wherein the first monophonic signal and the second monophonic signal are supplied to the virtual localization processing means after performing a  
 10 reduce correlation in which correlation between the first monophonic signal and the second monophonic signal is reduced.

14. The surround signal-processing device according to claim 7, wherein the virtual localization processing means comprises:

15 a first filter means, performing a processing upon receipt of the first monophonic signal;

a second filter means, performing a processing upon receipt of the first monophonic signal;

20 a third filter means, performing a processing upon receipt of the second monophonic signal;

a fourth filter means, performing a processing upon receipt of the second monophonic signal;

25 a first adding means, adding outputs of the first filter means and that of the fourth filter means so as to produce the first virtual localization output; and

a second adding means, adding outputs of the second filter means and that of the third filter means so as to produce the second virtual localization output.

30 15. The surround signal-processing device according to claim 7, wherein the virtual localization processing means comprises:

a fifth filter means, performing a processing upon receipt of the first monophonic signal;

a sixth filter means, performing a processing upon receipt of a second monophonic signal;

5 a seventh filter means, performing a processing upon receipt of an output of the fifth filter means;

a eighth filter means, performing a processing upon receipt of an output of the sixth filter means;

10 a first adding means, adding an output of the fifth filter means and that of the eighth filter means so as to produce the first virtual localization output; and

a second adding means, adding an output of the sixth filter means and that of the seventh filter means so as to produce the second virtual localization output.

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16. The surround signal processing device according to claim 15, wherein the virtual localization processing means comprises a delay processing means having a delay in time equal to that defined in the seventh filter means and the eighth filter means respectively in the fifth filter means and the sixth filter means.

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17. The surround signal-processing device according to claim 7, wherein the virtual localization processing means comprises:

25 a ninth filter means, performing a subtract processing between the first monophonic signal and the second monophonic signal so as to produce the first virtual localization output;

a tenth filter means, performing a processing upon receipt of the first monophonic signal;

30 an eleventh filter means, performing a processing upon receipt of the second monophonic signal; and

an adding means, adding an output of the tenth filter means and that



of the eleventh filter means so as to produce the second virtual localization output.

18. The surround signal-processing device according to claim 7,  
5 wherein the virtual localization processing means comprises:

a twelfth filter means, performing a subtract processing between the first monophonic signal and the second monophonic signal so as to produce the first virtual localization output;

10 a thirteenth filter means, performing a processing upon receipt of an output of the twelfth filter means;

a fourteenth filter, performing a processing upon receipt of a resulting data generated as a result of performing an adding processing between the first monophonic signal and the second monophonic signal; and

15 an adding means, adding an output of the thirteenth filter means and that of the fourteenth filter means so as to produce the second virtual localization output.

19. The surround signal processing device according to claim 18,  
20 wherein the virtual localization processing means comprises a delay processing means having a delay in time equal to that of the thirteenth filter means, the delay processing means being installed respectively in the twelfth filter means and the fourteenth filter means.

20. The surround signal processing device according to claim 18,  
25 wherein accuracy of the twelfth filter means in a low frequency region is higher than that of the thirteenth filter means and the fourteenth filter means in the low frequency region.

21. The surround signal processing device according to claim 18,  
30 wherein the twelfth filter means includes a processing means performing a filtering processing and a delay attenuation feedback loop connected to an

output of the filtering processing;

wherein the thirteenth filter means comprises a processing means performing a filtering processing and a means for performing attenuation and delay processing to an output of the filter means and adding processed output to the output of the filter means;

wherein the fourteenth filter includes a processing means performing a filtering processing and a means for attenuating an output of the processing means;

wherein an output of the twelfth filter means is subjected to a delay processing so as to produce the first virtual localization output; and

wherein outputs of the thirteenth filter means and that of the fourteenth filter means are made to the second virtual localization output.

22. The surround signal processing device according to claim 7, the device further comprising:

a fifteenth filter means, performing a processing upon receipt of the second monophonic signal so as to produce the second virtual localization output; and

a delay processing means having a delay in time substantially equal to that of the fifteenth filter means and performing a subtract processing between the first monophonic signal and the second monophonic signal so as to produce the first virtual localization output.

23. The surround signal processing device according to claim 7, wherein parameters of the filters, which vary depending on arrangements among the front left speaker, the front center speaker, the front right speaker and the listener, are stored in advance in a storing means; and

wherein an optimum parameter is selected in accordance with an arrangement being input.

24. The surround signal processing device according to claim 7, the

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device further comprising: one of an amplitude adjusting means for compensation and a compensation filter means, each for compensating differences in characteristics between the front right speaker and front left speaker.